COLLECTION AND CASE INCIDENCE OF THE OLD WORLD SCREW-WORM FLY, *CHRYSOMYA BEZZIANA*, IN THREE LOCALITIES IN INDONESIA

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ABSTRACT

A survey of the primary myiasis-producing screw-worm fly, *Chrysomya bezziana,* was carried out in three locations in Indonesia: West Timor, East Sumba and Jonggol, West Java. Collections of screw-worm fly were made as part of a global study of genetic variation of *C. bezziana.* The result indicate that East Sumba and Jonggol, West Java are highly favourable areas for *C. bezziana.* The host species included Ongole cattle, sheep, goats, horses and pigs.

ABSTRAK

Penelitian lapangan mengenai lalat screw-worm sebagai penyebab utama myiasis, *Chrysomya bezziana,* dilakukan di tiga lokasi : Timor Barat, Sumba Timur dan Jawa Barat. Lalat screw-worm dikumpulkan sebagai bagian dari studi umum tentang variasi genetik dari *C. bezziana.* Hasil yang didapat menunjukkan bahwa Sumba Timur dan Jawa Barat merupakan daerah yang serasi bagi perkembangan *C. bezziana.* Hewan inang dari lalat ini adalah sapi Ongole, domba, kambing, kuda dan babi.

INTRODUCTION

The Old World screw-worm fly, *Chrysomya bezziana,* is a primary myiasis producing fly which occurs throughout tropical and sub-tropical Africa, the Indian Subcontinent, Southeast Asia and New Guinea (Norris and Murray, 1964). *C. bezziana* is able to infect a wide range of domestic and wild animals and also man (Spradbery & Vanniasingham, 1980). Effects on host animals include loss of condition, maiming, infertility when genitals are struck, while severe lesions can prove fatal (Humphrey *et al.,* 1980).

The screw-worm fly, *C. bezziana* was first recorded in Indonesia in 1938 during an investigation of hoof myiasis of cattle in North Sulawesi (Kraneveld & Pettinga, 1948). *C. bezziana, Booponus intonsus* and *Sarcophaga dux* were found infecting the hooves of cattle (Kraneveld & Pettinga, 1948), and also horses (Kraneveld & Pettinga, 1949). Observation by Muchlis and Sutijono (1973) in North Sulawesi estimated that about 20% of the cattle were suffering myiasis. *C. bezziana* has also been recorded in other parts of Indonesia: in West Java by Djaenudin (1951) and in South Sulawesi and Sumba Island by Sigit (1978). Observations made in South Sulawesi and Sumba showed that roughly 10% of the cattle were infected by *C. bezziana* (Sigit, 1978).

As part of a global study to determine genetic variation in *C. bezziana,* collections of screw-worm fly material were made in Indonesia from 21 – 30 November 1988. The *C. bezziana* material was collected for morphological and biochemical studies, isoenzyme analysis and examination of polytene chromosomes. Additionally live *C. bezziana* was collected for hybridisation studies in the United Kingdom using flies from Africa, United Arab Emirates, Oman, Malaysia and Papua New Guinea.

MATERIALS AND METHODS

Locations

Three areas were selected to make collection of egg masses and larvae of screw-worm flies: Jonggol (West Java), Kupang (West Timor), and some villages east of Waingapu (Sumba), in the province of Nusa Tenggara Timur.

Procedures for collecting egg masses and larvae

Two collection procedures were used:

1. Egg masses and larvae of different stage were removed from natural infections.

2. Egg masses were harvested from artificially wounded animals. Straight rump incisions, 80 – 100 mm long on cattle and 50 – 80 mm long on goats, were inspected daily at dawn and dusk. At the end of the survey period the animals were given an injection of Ivermectin (Ivomec[6]) and were treated topically with Gusanex® or Coopers Fly Strike Powder.®

Rearing of flies

Egg masses and larvae were reared in the laboratory on a meat diet consisting of:

lean minced beef	54%
whole blood	15%
water	30.8%
formalin	0.2%

The lean beef was chopped into small pieces and then blended with the other ingredients. Blood was obtained from jugular venepuncture of cattle or, where available, from abattoirs. EDTA was added to the collected blood to prevent clotting.

Individual egg masses and larvae from wounds were put on the meat-based diet in small containers and maintained at a temperature of 37°C in a water bath heated by a small slide drier. The food was changed regularly, at least twice daily, the frequency depending on the larval stage and/or the number of larvae. At about 6 days the larvae migrated from the food, or were transferred to containers with 3 cm vermiculite for pupation. Pupae were maintained in the medium for about 6 days, then transferred to polystyrene cups covered with cotton gauze, from which the young flies were collected soon after they emerged. Some of the young flies were pinned for cuticular hydrocarbon and morphological studies, while others were stored in liquid nitrogen for isoenzyme analysis. Early pigmented pupae were stored in fixative for polytene chromosome studies. Some of the newly-formed pupae were consigned by air to London for the hybridisation study.

RESULTS

West Timor, Nusa Tenggara Timur

Seven Bali cattle, 4 goats and 4 pigs were wounded at 4 locations where strikes had been observed immediately prior to the survey. After 3 days observation no egg mass or larvae of *C. bezziana* were found on these animals. No naturally occurring strike were seen during the survey in West Timor.

Case incidence reports: Screw-worm fly activity was generally low on this island, although sporadic infections were recorded on pigs and goats immediately prior to the survey. Occasional navel strikes are recorded on new-born Bali calves at the Balai Penelitian Ternak field station at Lili, 40 kms north-east of Kupang.

East Sumba, Nusa Tenggara Timur

Egg masses and larval collections from village cattle in East Sumba were made from both natural and artificial wounds (Table 1). Six egg masses were collected

Table 1. Details of collections of the screw-worm fly *C. bezziana* in Indonesia

Date	Animal	Village	Sample*	Total Number of pupae
East Sumba				
24-11-88	Cattle	Kawangu	L2 + L3	38
25-11-88	Horse	Rindi	L2	10
	Horse	Rindi	1 egg mass	60
	Pig	Lumbukore	L2	7
	Horse	Hanggaroru	1 egg mass	0
	Horse	Rindi	3 egg masses	414
	Goat	Kawangu	1 egg mass	94
	Goat	Kawangu	1 egg mass	112
	Goat	Kawangu	1 egg mass	88
	Goat	Kawangu	2 egg mass	342
	Horse	Kawangu	L2	33
26-11-88	Sentinel Cattle	Rindi	1 egg mass	109
	Sentinel Cattle	Rindi	1 egg mass	55
	Sentinel Cattle	Rindi	1 egg mass	131
	Sentinel Cattle	Rindi	1 egg mass	39
27-11-88	Horse	Melolo	L3	48
	Horse	Melolo	1 egg mass	49
	Horse	Melolo	1 egg mass	60
	Sentinel Cattle	Rindi	2 egg masses	203
	Calf	Waingapu	L3	12
Jonggol, West Java				
28-11-88	Sheep	Sukamaju	20 mature larvae	20
	Goat	Sukamaju	1 egg mass	159
	Goat	Sukamaju	1 egg mass	6
	Sheep	Sukamaju	1 egg mass	28

* L2 = 2nd stage larvae
L3 = 3rd stage larvae

from 3 of 11 wounded Ongole cattle, and 148 mature larvae and 12 egg masses from naturally occurring wounds in Ongole cattle, horses, goats and pigs in various villages near Waingapu and Melolo. A total of 1,871 specimens of *C. bezziana* were collected from Sumba Island.

Case incidence reports: Although this survey was undertaken at the end of the dry season when conditions are not conducive to *C. bezziana* activity, it was evident that the Sandelwood ponies were very susceptible to attack. On the island's largest cattle holding where over 100 of these ponies are used for mustering purposes, 28 of them suffered from severe saddle gall at the time of the survey, and of these, 16 exhibited recently treated myiasis. Ponies without predisposing wounds can also be infected by screw-worm as seven vulval and two anal strikes on adults and a navel strike on a new-born foal were recorded elsewhere on Sumba. During the survey the death of a mature horse was attributed to myiasis on the face and body. (Personal communicating-Dinas Peternakan staff). Myiasis were also recorded on cattle (brands, navels, butt of tail) and pigs (neck, ears, navel).

Jonggol, West Java

Mature larvae and egg masses were collected from 2 of 6 artificially wounded goats and from one sheep and one goat which had natural wounds (Table 1).

Case incidence reports: Abrasions on the sternum of sheep and goats, caused by irritation from prickly undergrowth, were regularly struck, as are wounds associated with the application of ear tags. Daily inspections and preventive treatment of new-born animals is undertaken to avoid infection and subsequent mortalities caused by navel strike.

DISCUSSION

It was well documented that myiasis caused by *C. bezziana* is a major problem of livestock production in many regions of Indonesia (Sigit & Partoutomo, 1981). Information gained from our study indicates that all areas surveyed are endemic to *C. bezziana* but with different levels of activity. This variation is governed by the species of host, husbandry practises, ecological and climatic factors.

In west Timor where the cattle population is predominantly Bali type (Bos *sondaicus*) the incidence of myiasis caused by *C. bezziana* is minimal, possibly due to inherent resistance of the cattle, and also the husbandry practises employed.

Sigit (1978) reported that 10% of the imported Brahman and Brahman cross cattle in Sumba were infected by *C. bezziana*. Data from this survey indicates that the introduced Ongole cattle of Indian origins are also susceptible to screw-worm attack. The major husbandry practise of open grazing during daylight hours and concentrating the herds in "living" stockyards at dusk would increase the risk of myiasis *C. bezziana*. The Sandelwood ponies were highly susceptible with most myiasis observed in the softer tissues of the vulva, anus and escutcheon where there were no wounds. Other animal species such as pigs, goats and sheep are also susceptible. This survey was conducted at the end of the dry season, and many villagers advised us that the occurrence of myiasis would increase as the wet season progressed.

On Sumba Island the 1988 animal population census was 56,271 horses, 41,019 cattle, 78,052 buffaloes, 1,806 goats, 13,932 sheep and 153,552 pigs. As Sumba Island is a major source of cattle and horses for export to the rest of Indonesia, a study of the economic impact of *C. bezziana* on livestock production on the island would be of great interest.

C. bezziana appears to be endemic to some areas of Java (Sigit & Partoutomo, 1981) and can at times be a problem in livestock production, but the intensive nature of livestock industries on this island tends to lead to early detection and treatment of infections.

During this survey farmers admitted to using various topically applied preparations to treat infected animals including nicotine, petrol, battery acid, and proprietary screw-worm remedies such as Gusanex® , Baygon® and Asuntol ointment (coumaphos) has also been used in Indonesia (Muchlis & Partoutomo, 1973). Proprietory screw-worm remedies are expensive, with little residual protection. However, treatment of cattle with a single dose of Ivermectin (200 um/kg L.W.) has been shown to provide up to 14 days protection (Spradbery *et al.*, 1985). Perkins (1987) found that Ivermectin when administered at this rate provided at least 11 days protection from restrike which allows most wounds to resolve.

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